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(54) Plush Textured Multicolor Flock Transfer and Method for Making Same Using Precolored Flock

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ABSTRACT

A method of making a multicolored flock transfer which involves printing a release adhesive in a predetermined design upon a base sheet; sequentially flocking different colored flock through an open section of a barrier into the adhesive to result in a plurality of predetermined single color patterns arranged to form the predetermined design; and applying a binding adhesive to free ends of the flock.

A multicolor flock transfer including a base sheet having a surface area coated with a release adhesive; precolored flock of at least two different colors having ends adhering to the surface area of the base sheet to form predetermined color patterns of a design; and a binding adhesive applied to other ends of the precolored flock, and preferably also including a layer of supplemental adhesive covering the binding adhesive.

A fabric including a substrate material; a layer of binding adhesive having a predetermined design applied to the substrate material; and precolored flock of at least two different colors adhering to the layer of binding adhesive.

We claim:

1. A multicolor flock transfer comprising:
  - (a) a base sheet having a surface area coated with a release adhesive;
  - (b) precolored flock of at least two different colors that are longer than 0.3 mm having ends adhering to said surface area in the form of predetermined color patterns of a design; and
  - (c) a binding adhesive applied to other ends of said precolored flock, whereby said predetermined color patterns of said designs of said multicolor flock is adapted to be transferred onto a product.
2. The multicolor flock transfer of claim 1, wherein said flock has a length of at least 1 mm.
3. The multicolor flock transfer of claim 1, wherein said multicolor flock transfer is affixed to a textile.
4. A method of making a multicolored flock design on a product comprising:
  - (a) printing a release adhesive upon a base sheet;
  - (b) sequentially flocking different precolored flock through open sections of different barriers into said release adhesive to result in a plurality of single color patterns arranged to form a predetermined flock design;
  - (c) applying a binding adhesive to free ends of said flock to form a transfer of said flock design; and
  - (d) transferring said flock design from said base sheet to vividly form said flock design on a surface of a product.
5. The method of claim 4 wherein said base sheet is paper.

6. The method of claim 4 wherein said base sheet is transparent.

7. The method of claim 4, wherein said precolored flock has a length greater than 0.3 mm.

8. The method of claim 7, wherein said precolored flock has a length at least 1 mm.

9. The method of claim 4, wherein said barrier is a mesh screen.

10. The method of claim 4 wherein said binding adhesive comprises an adhesive to bind the fibers and a hot melt adhesive.

11. The method of claim 10 wherein said hot melt adhesive is applied as a separate adhesive layer.

12. The method of claim 8 wherein each of said barriers is a mesh screen.

13. The method of claim 12, wherein said product is a textile.

14. The method of claim 12, wherein said flock has a length greater than 0.3 mm.

15. The method of claim 12, wherein said flock has a length of at least 1 mm.

16. The method of claim 15, wherein said transferring comprises subjecting said flock design to heat and pressure and wherein said product is a textile.

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17. The method of claim 16 wherein said base sheet is removed following the application to a textile by heat and pressure.

18. The method of claim 4, wherein said product is a textile.

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PLUSH TEXTURED MULTICOLORED FLOCK TRANSFER AND METHOD  
FOR MAKING SAME USING PRECOLORED FLOCK

BACKGROUND OF THE INVENTION

5

1. Field of the Invention

10 The invention generally relates to a method of manufacturing flock transfers. Specifically, the invention is directed to methods of manufacturing flock transfers which exhibit an enhanced texture, particularly flock transfers composed of a plurality of precolored flock.

2. Description of the Prior Art

15 There are two basic methods of applying a multicolor flock design to a surface. The first method is referred to as direct flocking. The second is by means of flock transfers.

20 In the former instance, the flock is applied directly to the surface that forms the finished product. Usually wallpaper, carpets and decorative elements of garments are produced in this manner.

25 An example of direct flocking is found in U.S. Patent No. 3,793,050 to Mumpower. This particular direct flocking method is unique in that it allows the use of different color and size of flock in the same design surface to be flocked. The adhesive is rendered tacky and each color of flock is passed through a screen that restricts that color to the desired part of the adhesive layer. A multicolor  
30 flock design is thus obtained on the surface.

Multicolor direct flocking suffers a number of disadvantages. It is an exacting procedure with many variables to be controlled requiring specialized flocking equipment and an environment that is controlled for relative  
35 humidity. During the startup of such a procedure many reject-quality articles may result as the variables are

adjusted by trial and error until the desired result is found. The procedure is relatively slow since usually only one article at a time may be decorated. Further, if the article to be decorated has an uneven surface like many  
5 textiles, then density of the flock, control, speed and the quality of the finished design i.e. sharpness of lines separating colors, vivid images, etc., would be adversely affected.

It is believed that direct flocking has been limited in  
10 use in the United States.

Examples of flock transfers, i.e., the second method of employing flock fibers in a decorative manner, are illustrated in United States Patents 4,292,100 and 4,396,662 both to Higashiguchi and UK Patent applications 2,065,031 to  
15 Maitland and 2,126,951 to Transworth. Transfers are formed by applying flock to a release sheet having a temporary release adhesive coating. The flock is then colored with different color inks and coated with a binding layer and hot melt adhesive in a desired decorative design. The transfers  
20 are applied to articles with heat and pressure. The release sheet is peeled away leaving a finished decorative design.

Conventional multicolor flock transfers also suffer from a number of disadvantages. The basic underlying problem is that the flock transfers use a very short fiber  
25 and are, therefore, relatively flat so that a plush textured multicolored look is not achieved. Thus, a transfer having a richly textured appearance has not been achieved using flock to justify the additional cost over conventional screen printing.

30 In this regard, flock fibers of conventional flock transfers must be short because of a fundamental limitation of conventional flock transfer manufacturing methods caused by the problem of penetrating the flock fiber with printing ink to form the desired design. Typical flock fibers used  
35 in flock transfers are only about 0.3 mm long because if fibers longer than about 0.3 mm are used, it is difficult

for subsequently applied ink to penetrate along the full length of the fibers; when a sufficient amount of ink is supplied to do so there results a smudged design. This is unlike direct flocking which can use precolored flocks of  
5 approximately 0.5 mm to 3 mm in length.

An object of the present invention, therefore, is to produce a plush textured multicolored flock transfer which has a three dimensional appearance using longer flock than heretofore was possible.

10 Another object is to provide a method of producing plush-textured, multicolored flock transfers in batches containing more than one transfer per batch.

Another further object of the invention is to provide a method of decorating articles with a multicolor plush  
15 textured design which overcomes the disadvantages and limitations of direct flocking.

Another still further object of the invention is to allow manufacturers of products to economically make use of plushly-textured flock designs in place of screen printed  
20 designs.

#### SUMMARY OF THE INVENTION

In general, the present invention is directed to a multicolored flock transfer comprising flock having a fiber length longer than about 3 mm, up to about 5 mm, and  
25 preferably longer than about 5 mm, up to about 1 cm, and longer than 1 cm for the most preferred plush texture.

Related to this, the present invention is also directed to a fabric including a substrate material; a layer of binding adhesive having a predetermined design applied to  
30 the substrate; and precolored flock of at least two different colors adhering to the layer.

In accordance with the present invention there is also provided a method of applying a multicolor flock transfer to a substrate material which involves providing a multicolor  
35 flock transfer including flock having a fiber length longer than about 3 mm up to about 5 mm, and preferably longer



than 5 mm up to 1 cm, and more preferably longer than 1 cm, and applying the multicolor flock transfer using heat and pressure to a substrate material, such as a fabric or textile, which may have a textured or irregular surface.

5 In order to accomplish the previously mentioned objects, the present invention is directed to a method of making a multicolored flock transfer or transfer sheets which involves sequentially flocking a different precolored flock into a pre-designated color pattern of an overall  
10 design using flock having relatively long fibers to result in a plush textured flock transfer.

More particularly, the present invention is directed to a process for manufacturing transfer sheets which involves forming on the surface of a base sheet an adhesive layer for  
15 temporary adhesion of a plurality of different colored flock fibers to the base sheet, temporarily sticking the different colored flock to the adhesive layer to form a multicolored fiber layer, and applying an adhesive in the multicolor fiber layer to a desired pattern to form a binding adhesive  
20 layer, wherein the colored flock fibers are precolored to the plurality of different colors before sticking the different colored flock fibers to the adhesive layer.

The present invention, more specifically, is directed to a method of making a multicolored flock transfer which  
25 involves printing a release adhesive upon a base sheet; sequentially flocking different colored flock fibers through an open section of a barrier into the adhesive to result in a plurality of predetermined single color patterns arranged to form a predetermined design; and applying a binding  
30 adhesive to free ends of the flock fibers.

The present invention is also directed to a multicolor flock transfer which includes a base sheet having a surface area coated with a release adhesive; precolored flock fibers of at least two different colors having ends adhering to  
35 said surface area to form predetermined color patterns of a design; and a binding adhesive applied to other ends of said

precolored flock fibers, wherein the multicolor flock transfer of the present invention preferably also includes a layer of supplemental adhesive covering the binding adhesive.

5 For purposes of the present invention, the colored flock include fibers longer than .3 mm, e.g., having a length within the range of 0.5-3 mm, but preferably having a length of at least about 3 mm up to about 5 mm, although  
10 fibers having a length greater than 5 mm up to about 1 cm are more preferred, and flock with fibers particularly longer than 1 cm are most preferred for producing flock transfers with a plush texture.

The flock fibers should be conductive material, such as synthetic materials, selected from the group consisting of  
15 rayon, nylon, polyamide and polyester materials, and preferably is rayon.

The base sheet is a material selected from the group consisting of paper, resin and metal foil and preferably is a dimensionally stable sheet of paper, which may be  
20 transparent.

The release adhesive may be applied in the form of a solution or emulsion, such as a resin or a copolymer, such as polyvinyl acetate, polyvinyl alcohol, polyvinyl chloride, polyvinyl butyral, acrylic resin, polyurethane, polyester,  
25 polyamides, cellulose derivatives, rubber derivatives, starch, casein, dextrin, gum arabic, carboxymethyl cellulose, rosin, or compositions containing two or more of these ingredients.

The binder adhesive is a resin, preferably selected  
30 from the group consisting of polyvinyl chloride, polyvinyl acetate, polyurethane, polyester polyamide, and acrylic resin, such as a water based acrylic resin, and may also include a hot melt adhesive, such as a hot melt adhesive selected from the group consisting of polyurethane,  
35 polyester and nylon, which is preferably applied as a separate adhesive layer.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross-section of the multicolor transfers in accordance with the present invention.

Fig. 2 is a cross-section of the multicolor transfer in accordance with the present invention illustrated in Fig. 1 showing its application to a textile or fabric.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in Fig. 1, the transfer 2 of the flock transfer present invention comprises a base sheet 4, such as dimensionally stable paper, to which a conventional flock transfer release adhesive 6, usually silicone wax, is applied. The base sheet, however, may be any material which can be suitably used with the adhesive which should be selected to effect temporary adhesion of the flock fibers. Although paper, such as processed paper, is preferred, resin sheets and metal foils may also be employed. Depending on the desired effect and the sheet materials employed, the base sheet may be transparent, translucent or opaque.

The release adhesive 6 may be applied in the reverse of a desired pattern, that is, a pattern which corresponds to the overall image which is to be flocked. Preferably, however, all release adhesive may be applied without regard to the overall design desired, particularly when the precolored flocks are sequentially applied to the adhesives, as discussed in more detail hereinbelow. The release adhesive may be applied in the form of a solution or emulsion, such as a resin or a copolymer, such as polyvinyl acetate, polyvinyl alcohol, polyvinyl chloride, polyvinyl butyral, acrylic resin, polyurethane, polyester, polyamides, cellulose derivatives, rubber derivatives, starch, casein, dextrin, gum Arabic, carboxymethyl cellulose, rosin, or compositions containing two or more of these ingredients.

The flock 8 is preferably composed of fibers, which may be referred to herein as flock fibers. The flock may be rayon, and other types of conductive material, such as nylon, polyamide, polyester and similar synthetic fibers,

and is applied to the activated adhesive 6 by conventional electrostatic processes, spraying, or by gravity, such as sprinkling or vibrating the flock onto the surface of the base sheet provided with the release adhesive.

- 5       The flock 8 is coated with a binder adhesive 10, such as a water based acrylic, which binds the flock into a unit. Preferably the binding adhesive is applied in the form of a solution or emulsion. The binder adhesive preferably contains a resin, such as polyvinyl chloride, polyvinyl acetate, polyurethane, polyester, polyamide, and acrylic resin, and preferably the previously mentioned water based acrylic. The binder adhesive 10 may contain additional or supplemental adhesives, such as a hot melt adhesive, usually a granular polyester or nylon, for binding the transfer to a
- 10       substrate. Alternatively, the hot melt adhesive 12, may form a separate layer. The use of separate hot melt layers is preferable. In addition, other heat sensitive adhesives, such as polyvinyl chloride, thermoplastic acrylic resin, polyethylene, polyamide, polyurethane, paraffin and rubber derivative may be used for this purpose, with polyurethane being preferred.
- 15       In order to achieve a multicolor effect, the flock 8 is applied through a barrier which is preferably a gauze-like mesh screen. The multicolor effect is achieved by using
- 20       different precolored flock. As used herein, precolored flock means that the flock has been colored before being flocked, stuck or otherwise applied to the release adhesive. Depending on the overall design and the number of colors of flock which are to be used, an appropriate number of
- 25       barriers or screens are prepared to have open sections to permit passage of flock in a predetermined configuration or color pattern. Alternatively, a single screen may be sequentially masked for this purpose. In either case, the open sections of each mask or screen are designed to permit
- 30       passage of flock fibers in a configuration which corresponds to the areas of the final design which correspond to only

one of the plurality of colors, i.e. color pattern, intended to be used in the final or overall design. In accordance with the present invention, each different color of flock is preferably applied sequentially using a different screen to result in the particular precolored flock passing through the open section of the screen onto a corresponding section of the release adhesive 6 to form a color pattern.

Inasmuch as the precolored flock which form the color pattern do not require being printed with ink following flocking in order to effect different colors, as in a conventional multicolor transfer, the length of the flock can be as long as practical for the transfer depending on the desired aesthetic effect. In this regard, the flock fibers may be substantially longer than 0.3 mm, or even longer than 0.5-3 mm, the main limiting concern being the plushness of the texture of the flock transfer and the desired aesthetic effect which is intended to be achieved. In this regard, flock transfers having a fiber length of within the range of 3 mm up to 5 mm, and longer, can be used to result in a flock transfer which is much more plush, vivid and three dimensional than flock transfers wherein shorter fibers, i.e. 0.3 mm or 0.5-3 mm, are used. In accordance with the present invention, therefore, flock having a fiber length within the range of 5 mm to 1 cm is more preferred with a fiber length longer than 1 cm being most preferred.

Fig. 2 illustrates the application of the transfer to a textile 14, such as garment, or other surface. In accordance with the present invention, the substrate material, i.e., fabric or textile, can have a relatively smooth, regular surface, such as a piece of cloth, or may have a textured or irregular surface, such as fishnet material. In this regard, the present invention is applicable to any type of garment or piece of wearing apparel to which it is desired to affix or imprint a word,

design, logo, emblem or other sign or symbol, particularly shirts, jerseys, jackets, pants, shorts and caps, such as those designed to be worn during athletic activities, e.g., U.S. football jerseys and baseball caps. Moreover, although flock transfers are normally applied to substantially flat surfaces of a garment, the flock transfers of the present invention are particularly suitable for application of a flocked design to a curved or undulating surface without adversely affecting the vividness or other characteristics of the flocked design. Thus, the flock transfer of the present invention is advantageous in that it can be applied to almost any type of surface regardless of its texture or configuration. For example, although many textiles or fabrics to which flock designs are transferred may have a close-knit weave, the flock transfers of the present invention may be applied to fishnet and open mesh fabrics as well. To this end, the hot melt surface 12 is placed against the textile 14. Heat and pressure is applied to the release sheet 4 in order to bond the transfer to the garment. The release sheet 4 with the adhesive 6 is then pulled away from the flock 8. This leaves a transfer permanently affixed to the garment.

The present invention utilizes the general materials and flocking techniques found in the United States Patents 3,793,050; 4,292,100; and 4,396,662 and U.K. Patent applications 2,605,031 and 2,126,951, to which the reader is referred.

Although the invention utilizes conventional materials and techniques which can be generally found in various prior art references, the specific manner by which the method of the present invention is performed permits a much longer flock than heretofore was practical to be used so that the particular combination of elements and the manner by which they are combined in accordance with the present invention produces a unique and superior flock transfer.

EXAMPLE

The following is an illustrative example of a method of producing the flock transfers for purposes of the invention comprises:

- 5 a) an acrylic layer 6 is applied in the reverse of a predetermined pattern to a dimensionally stable base sheet 4, such as a bond paper;
  - b) a first color of nylon flock fibers 8 having a length of about 5mm is passed through a monofilament  
10 polyester screen for ten to fifteen seconds in an electrostatic field. The screen has open sections in those areas which correspond to the first colored section of the reversed design. Inasmuch as the wax acts as a ground for the charged particles, the flock 8 becomes embedded in the  
15 wax layer 6;
  - c) this procedure is then followed for each succeeding color of nylon flock fibers 8 that is to be electrostatically flocked in order to form the desired design, after which the resultant unit is dried;
  - 20 d) the tips of the exposed flock 8 are printed using conventional screen printing equipment with a water based (40%-60% water) acrylic binder 10. The binder 10 binds the flock 8 and further provides opacity and brilliance by reflecting light;
  - 25 e) the binder 10 is dusted or powered with a polyurethane hot melt adhesive 12 and the transfer is then air-dried;
  - f) after brushing and vacuuming excess adhesive 12, the transfer is placed in an infrared dryer to cross link  
30 the binder 10 and adhesive 12 to form the multicolor flock transfer in accordance with the present invention.
- To apply the transfer to a textile 14, the adhesive surface 12 is positioned on the textile 12. A hot surface heated to a temperature of about 300-350° F is pressed  
35 against the paper for about 20-30 seconds. The transfer is allowed to cool, preferably to an extent that it can be

manipulated by hand, and the paper 4 and wax 6 are removed by peeling the paper 4 from the flock 8. The desired flock design is thus transferred and permanently affixed to the textile.

5       It is believed that the advantages and improved results furnished by the methods and products of the present invention are apparent from the foregoing description of the preferred embodiment of the invention. Various changes and  
10       modifications may be made without departing from the spirit and scope of the invention as described in the claims that follow.



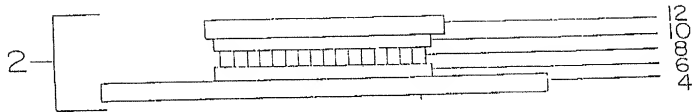


FIG. 1

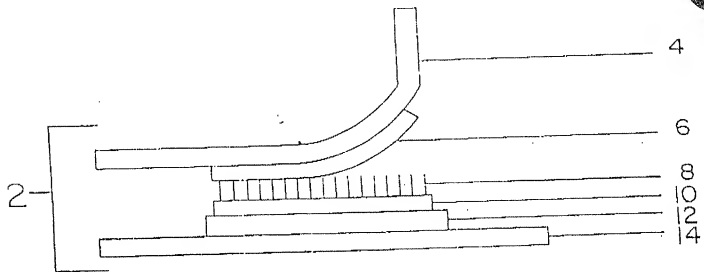


FIG. 2

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